

# Forest Villagers in Northeastern Hill Forests of Bangladesh: Examining Their Livelihoods, Livelihood Strategies and Forest Conservation Linkages

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**Abstract** Even though many forest villagers have been living on forest department land and serving the department in the northeastern hill forests region of Bangladesh since the early 1950s, their livelihood has not yet been fully explored. This paper examines the livelihoods of forest villagers (Khasia ethnic people) and their contribution to forest conservation, using data from the Sylhet forest division. The forest villagers are well-endowed with all the elements of a sustainable livelihoods framework, though human capital in terms of education is not satisfactory. Strong social capital, stable natural capital and a productive market-oriented agroforestry system facilitate the generation of financial and physical capital that make the livelihoods of Khasia people sustainable. At the same time, their reciprocal contributions in terms of forest protection and plantation development support forest conservation. However, some institutional issues such as insecure land tenure with regular agreement renewal problems need to be resolved for the sake of their livelihoods and forest conservation. Lessons learned from the study can be utilized in formulating future participatory forest management schemes in the country.

**Keywords** Khasia · Agroforestry · Betel leaf · Livelihood capital · Forest conservation

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## Introduction

Improving the livelihoods of forest dependent local people has received growing attention during the last two decades as a measure of sustainable forest management and focused on the degree of concentration of forest-based livelihoods in a particular area (Mahdi et al. 2009; Amoah and Wiafe 2012). Worldwide, forests provide multiple benefits at local to global scales that include the global public good of carbon sequestration and local and national level contributions to livelihoods for more than half a billion users (Chhatre and Agrawal 2009). Confronted with poverty due to small landholdings and scarce non-farming employment opportunities, villagers have benefited considerably from forest resources as a means of poverty alleviation (Pandit and Thapa 2004; Belcher 2005; Thomas 2008). Recognition of the diverse socioeconomic and ecological contributions of forests has prompted many governments to pursue policies for improved livelihoods and conservation outcomes (Persha et al. 2011). However, reducing poverty with forest products requires local participation and access to forest rents through the building of institutions and capacity within forest communities, and devolution of rights and responsibilities for local resource management (Belcher 2005; Sunderlin et al. 2005; Virtanen 2005; Blay et al. 2008).

As in many countries, more than 50 % of the total forested areas of Bangladesh are inhabited by several distinct ethnic communities. The Khasia ethnic community, some of whom have been serving the Sylhet forest division as forest villagers since the early 1950s, is predominant in the northeastern hill forests. Introduction of forest villagers in Sylhet forest division was considered the main force behind forest conservation and plantation expansion. Forest reservations in this division started in 1914 (Sylhet Forest Division 1970), reducing to shifting cultivation and grazing. However, the condition of the forests did not improve due to illegal forest product extraction and the continuation of shifting cultivation (Nath et al. 2003). Little virgin forest is now left in what is almost entirely secondary forest.

With the objective of restoring previous forest coverage, the Forest Department (FD) commenced plantation programs in Sylhet forest division in the 1920s (Sylhet Forest Division 1970), but little was achieved due to a labour shortage. To overcome this shortage, the FD initially registered a few Khasia people as forest villagers in 1952–1953. These people had moved from the nearby Indian border (near the Jaintia hills), and from various parts of Sylhet forest division where they had migrated many years before from India. They were granted degraded forest land for building homes and agroforestry practices on the condition that they supply their labour when and where needed for plantation development and protection of the forest from pilferage. Under this scheme, the plantation program gained momentum during 1955–1960 with the establishment of about 200 ha/year, and increased in 1975–1980 to about 500 ha/year (Drigo et al. 1988).

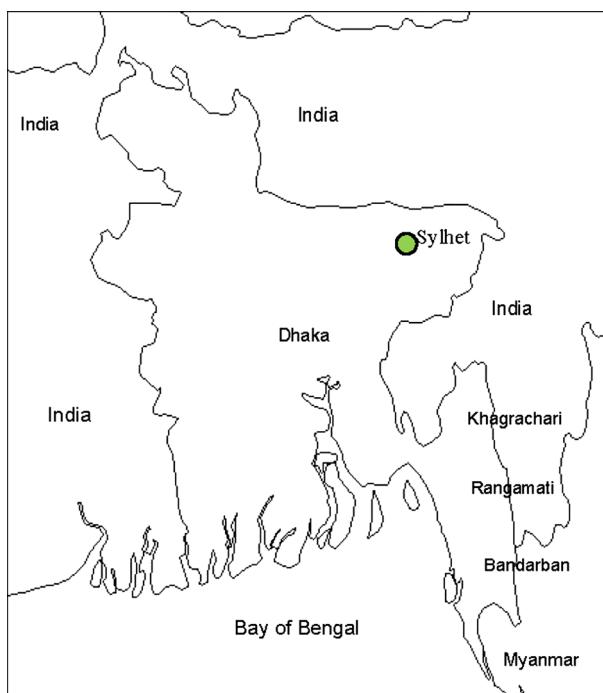
Even though Khasia forest villagers have been living on FD land and utilizing forest resources for their survival for more than half a century, their livelihood pattern has not been closely studied. Several earlier studies (e.g. Nath et al. 2003; Saha and Azam 2004, 2005; Nath and Inoue 2009) explored the socio-economy of forest villagers and their farming systems, and performed financial analyses of

farming systems. This study examines the livelihood and livelihood strategies of forest villagers, and their contribution to forest conservation.

## The Study Site

There are six Khasia forest villages (*punji*) registered with Sylhet forest division. Forest conditions (in terms of growth and stock) and socio-economic circumstances among the villagers in all villages have no distinct differences. One representative village was selected randomly from six villages for the study. For conducting social research, Yin (2003) suggested selecting one representative case study site if there are no notable differences among sites. Attempting to answer research questions by studying one village in a case study approach presumes that the village studied is somehow representative (Jakobsen et al. 2007). The selected Khasia *punji* (Fig. 1) is located inside Lawachara National Park with coordinates of 24°30' to 24°32'N and 91°37' to 91°39'E. Topographically the area consists of many hillocks (*tila*) having an elevation of not more than 50 m with moderate slope.

The vegetation of the area consists of mixed semi-evergreen old secondary regrowth. Almost 100-year-old plantations have created multistoried dense forest looking like virgin natural forest. The most commonly visible plant species include *Tectona grandis*, *Artocarpus* spp., *Quercus* spp. and *Amorphophallus* spp.



**Fig. 1** Map of Bangladesh showing the study site (green circle). (Color figure online)

Commonly found wildlife include *Hoolock hoolock*, *Macaca* spp. and *Trachypithecus* spp. Agro-ecologically the site belongs to the northern and eastern hills of Bangladesh and the general soil types are brown hill soils (Banglapedia 2001). Soil organic matter and fertility level are generally low and texture is generally sandy loam or silty loam.

## Research Method

### Analytical Framework

The study had the dual purposes of investigating livelihoods and the relationship between livelihood strategies and forest conservation. In analyzing the villagers' livelihoods, the research followed the sustainable livelihood (SL) framework described by Scoones (1998) and DFID (2001) because of its simplicity and wide use by researchers, combining both qualitative and quantitative data to understand fully villagers' livelihoods at the local level. The SL framework is defined as a tool that provides new ways to address rural poverty issues beyond the traditional methods of employment generation and target group programs, and which examines how sustainable livelihoods are achieved through access to a range of livelihood capital (human, physical, financial, natural, and social) identified in the framework (Scoones 1998; Messer and Townsley 2003). It emphasizes understanding of the institutional processes (tenure, participation, and credit arrangements) that enable the identification of obstacles to and opportunities for SL (Scoones 1998). The framework is useful for explaining the interrelationships among various forms of livelihood capital and their utilization in diversifying livelihood strategies to attain desired outcomes (e.g. increased income and stable natural resource base) in the available enabling environment (policy, institution, and governance).

For examining the contribution of forest villagers to forest conservation, researchers examined what roles villagers play for forest protection and forest expansion, and how they utilize forests for their livelihoods.

### Data Collection

In the first step of the study, the researchers walked the village with forest staff and the *mantri* (leader of the Khasia *punji*) to ascertain the village's general features including agroforestry conditions, land uses, and the village road and house construction materials. Talks with forest staff and the *mantri* revealed a wealth disparity among villagers. Therefore, following Grandin (1988) participatory wealth ranking<sup>1</sup> was conducted with the help of four key informants including the *mantri*. Initially they identified variables including income, household labour, and the

<sup>1</sup> For wealth ranking, a list of all households was prepared, each household having a separate card number with the name of its household head. All cards were then ranked by the key informants independently, based on criteria each chose following their discussion.

number of *jhum*<sup>2</sup> in each household. After a long discussion, the informants concluded that the main factor affecting household wealth in this Khasia *punji* is the number of agroforestry plots (hereafter AF plots). Their argument was that households having multiple AF plots could harvest products sustainably and thus have a constant income flow. Based on their opinion, all 21 households of the village were placed into one of two categories: Category A (six households with two or more AF plots, and Category B (15 households with only one AF plot).

Quantitative data were next collected through a household survey, using a semi-structured questionnaire. The questions were designed to help collect data on all five forms of capital in the livelihood framework. A pilot survey with five sample households was conducted, with some questions found unnecessary and deleted, and some new questions added. In the main survey, personal interviews were conducted with household heads. All villagers cooperated in the survey. Some villagers were revisited on the day following the interview to clarify confusing data.

The monetary values of physical capital (e.g. television sets, cassette players and motorcycles) were taken as villager's estimated resale values. To assess household income and expenditure, villagers were asked about their weekly income and expenditures for particular items, including food, health care, crop production and social events (religious festivals). The reported figures were converted to an annual basis. Even though income and expenditure estimates are inexact, these provide a general picture of savings. Direct estimation of household savings proved difficult because villagers were reluctant to provide the information. The principal cost in agroforestry is labour, and therefore villagers were asked how many men and women they employ for how many days annually, and the cost for wages. Ordinal scales were used to measure variables of trust in villagers and FD officials and solidarity with villagers under social capital.

In the third step, qualitative information was collected through a group discussion and informal talk with villagers, forest officials and NGO staff members, and personal observations of house and agroforestry were made. Group discussions were conducted with six men and two women, and highlighted issues such as their problems related to livelihoods, local institutions, and their FD activities. A separate semi-structured questionnaire facilitated the discussion. Talks with forest officials dealt with villager participation in forest management activities and their perceptions of the role of villagers in forest conservation. Researchers talked with Khasia people of varying ages about social issues including social relations, conflicts, the *mantri*'s activities, their education, and daily activities. NGO staff members told about their activities in the Khasia *punji*.

Agroforestry plots were visited, and tree species composition identified. A one-way analysis of variance was conducted to test for differences among some variables of the two categories of households.<sup>3</sup>

<sup>2</sup> In the Chittagong Hill Tracts of Bangladesh, shifting cultivation is popularly known as *jhum*, but Khasia people call their agroforestry plots *jhum*. The mean area of a *jhum* is about 1 ha.

<sup>3</sup> Although all households of the selected village are included in the study, from the perspective of statistical testing these are considered as a sample for the six villages in the study area. Although the number of observations was only 21, a one-way analysis of variance was conducted for comparison of means in relation to the wider population.

## Interpretation of Results

This section explains the state of five forms of livelihood capital in the SL framework, then discusses livelihood strategies, linkages between livelihood strategies and forest conservation, and issues of local-level governance and other relevant livelihood issues.

### State of Livelihood Capital

In the rural livelihood framework, the ability of households to pursue livelihood strategies is recognized as depending on their available livelihood capital (Cramb et al. 2004). The variables of livelihood capital adopted are mostly those of individual household capital. Village-level capital is considered in the form of social capital only.

#### *Human Capital*

In the 21 sampled households, the total number of household members was found to be 18, and the average 5.62. The Khasias are partly animist and partly scheduled caste Hindu—the latter being rapidly Christianized (Rashid 1991)—and enjoy a matrilineal society. Even though gross literacy and male and female literacy percentages were found to be higher in category A households, the present female education rate is highest in households of category B (Table 1). This is due to parental awareness raised mainly by NGOs. Male education, however, is considerably higher in category A households. Reasons cited are distant schools and involvement in agroforestry activities. Public schools are about 7–10 km from the village and communication is very limited, especially in the monsoon season. Better-off families send their children (sons only) to Christian missionary schools, and have to bear the costs of tuition, accommodation and living expenses. In category A households, it was noticed that one person (*mantri*) had graduated and obtained an SSC (Secondary School Certificate) from a missionary school. However, most of the children dropped out after 7 or 8 years of schooling, then engaged in agroforestry activities and contributed to household income. Respondents commented that due to schooling some of their girls obtained jobs in NGOs. The mean number of active members contributing to household income was found to differ significantly between the two categories ( $P < 0.003$ ,  $F = 11.19$ ). Apart from formal education, villagers trained in plantation development activities including nursery practices and planting. They are skilled in managing betel-leaf-based agroforestry. They reported that education, training and their indigenous knowledge on agroforestry help them to make a living.

#### *Physical Capital*

Only one category B household had a bamboo mat-walled house thatched with sun grass (*Imperata cylindrica*) and all other households of both categories had mud-walled houses with corrugated iron sheet roofing. All houses had cement floors, with

**Table 1** State of human capital at household level in the studied Khasia *punji*

Variable	Type of household	
	Category A	Category B
Mean household size (no.)	7	5
Male: female ratio	1:1	1:1.1
Members ≤11 years (no.)	7	19
Members 11–59 years (no.)	36	55
Literacy (%)	89	57
Male/female literacy (%)	100/77	52/48
Average schooling years	10	8
Current school enrolment (%)		
Primary (male/female)	12/6	8/9
Secondary (male/female)	27/–	5/7
Average number of household members contributing cash income	5	3 <sup>a</sup>

<sup>a</sup> Indicates significant difference at the 0.1 % probability level

cement coated earth (*dela*) around the base of the walls. Due to the remote location and lack of recreation facilities, almost all households of the *punji* had either a television, a cassette or CD player, or a radio. Those without TVs watch their neighbours' TVs. Antenna on long bamboo poles allowed access to programs from India. Because they were not on an electricity grid, respondents used nine-volt batteries to run televisions and other appliances, battery charging costing US\$ 2.5 a week. Among other physical capital, one household (*mantri*) was found to have a motorcycle and a deep tube-well. This farmer is able to irrigate his AF plots in the dry season by using a long plastic pipe. He also uses the well for household water. Some Khasia *punji* households obtain drinking water from the *mantri*'s house, but all households have access to two other ring-wells for drinking water. Because they are open-top wells, the water becomes contaminated and villagers suffer from stomach diseases. Based on survey estimates, the mean equivalent monetary values of the physical capital is US\$ 113 for category B households and US\$ 317 for category A households (Table 2).

The state of livestock husbandry in Khasia *punji* is not encouraging. The villagers said that they are interested in raising cattle, but have insufficient land at their homesteads. If they allow open livestock grazing, livestock might damage the betel leaf plants. Two category B households have one cow and three chickens, respectively. The *Mantri*, who has three cows and four goats, employs a boy to look after his livestock while they graze in the adjacent forest.

### Natural Capital

From FD-granted land of 1.21 ha per household, each household was allocated 1.01 ha for an AF plot and the remaining 0.2 ha for a house. All households built their houses in a compound at the top of hillock that is surrounded by their AF plots. Even though all households supposedly have equal areas of land in this Khasia *punji*, it was found that category A households possessed more land (averaging

**Table 2** Status of physical capital at household level in the studied Khasia *punji*

Variable	Type of household	
	Category A	Category B
Television (% of households)	83	53
Cassette player (% of households)	67	20
CD player (% of households)	33	20
Radio (% of households)	33	33
Battery (% of households)	100	53
Motorcycle (% of households)	16	—
Deep tube-well (% of households)	16	—
Mean equivalent money (US\$)	317	113 <sup>a</sup>

<sup>a</sup> Significant difference at the 5 % probability level

4.42 ha) than category B households. The average number of AF plots (3.92) for category A households was significantly ( $P < 0.01$ ,  $F = 22.19$ ) higher from that of category B households. The *mantri* said that as *punji* heads their families received 2.42 ha of land, but forest officers said that all villagers were granted equal amounts of land. Another person having more than 1.21 ha said he purchased some land from others. Other households inherited the land of their deceased *gousti* (extended male-lineage family members). A report by NACOM (2003) indicates that about 29 ha of forest land has been taken by two Khasia *punji* in the study area. However, NACOM also reported that much more land has been encroached on by non-Khasia people, i.e. Bengalis who have migrated there.

Forest land encroachment and land tenure are important but still unresolved issues in Sylhet forest division as well as in other parts of Bangladesh. Forest villagers still have not been provided legal land certificates. Because these people have been serving the FD as unpaid labour for the protection and expansion of forest resources, they have an ethical claim to permanent land tenure. Bonfiglioli (2004) reported that measures to protect and manage natural resources are directly proportional to confidence in the security of land tenure. Securing land tenure rights is often seen as a means of furthering sustainable natural resource management by increasing the incentive to invest in long-term soil improvement (Jakobsen et al. 2007). The FD, with mutual understanding and negotiated agreements, needs to provide permanent land title to the villagers. If the FD did this, it could recover the illegally settled land by re-demarcating the boundaries of granted land. Because the studied Khasia *punji* is located inside a national park, the recovered land could be managed under a co-management scheme. Agrawal and Gupta (2005) argued that conservation areas and buffer zone management have come to rely on user groups based in settlements located close to or within protected area boundaries. This land could form buffer zones in which villagers establish fuelwood plantations, hence reducing logging pressure on park resources. However, the question may arise whether recovery of illegally settled land would hamper villagers' livelihoods. It was observed that all of them have AF plots in other areas, and even income from an AF plot (Table 3) can maintain livelihoods comfortably. Hence, recovery and use of illegally settled land for buffer zone plantations would not hinder their livelihoods.

**Table 3** Selected social capital variables of households in the studied Khasia *Punji*

Variable	Household type	
	Category A	Category B
Groups and networks		
Household communication network	13	9**
No. of people willing to help by giving money in emergencies	8	6**
No. of people currently able to provide this money	7	4***
Times travelled to relatives last year	8	6**
Trust and solidarity		
Opinion on the statements <sup>a</sup>		
Most people living here can be trusted	1.50	1.53
One has to be alert or someone is likely to take advantage of you	4.6	4.8
Most people are willing to help if needed	1.83	1.87
People generally do not trust each other in lending or borrowing money	4.50	4.60
Trust in the following people <sup>b</sup>		
People of same ethnic group	4.60	4.93
Village leader	4.60	4.75
Leader responsiveness	4.60	4.80
Forest Department (FD) personnel	3	—
FD personnel responsiveness	3	—
Village group members	4.17	4.07

<sup>a</sup> Values are average of five-level scale used (1 = agree strongly, 2 = agree somewhat, 3 = neither agree nor disagree, 4 = disagree somewhat, 5 = disagree strongly)

<sup>b</sup> Figures are average of five-level scale used (1 = to a very small extent, 2 = to a small scale, 3 = neither small nor great extent, 4 = to a great extent, 5 = to a very great extent)

\*\* Significant at the 1 % level; \*\*\* Significant at the 0.1 % level

The important point is that the farmers need to be motivated and convinced to give up illegally settled land, and be given a sound understanding of the importance of participation in co-management. Policy regarding benefit sharing and the level of participation need to be clearly formulated based on negotiations between villagers and the FD.

As well uncertain land tenure, villagers have no rights to trees; they are not permitted to fell or sell any trees from their homesteads or from AF plots. They can only utilize forest land and trees for growing betel leaf. They surely deserve at least some share of harvest rights to these trees because they plant and take care of these trees at their own expense. Saha and Azam (2005)<sup>4</sup> argued that such a benefit-sharing option would increase income of villagers and create a sustained flow of revenue for the FD.

By using a four-level scale (4 = very good through to 1 = poor) villager's opinion was sought on forest conditions (composition, stock and growth) of AF

<sup>4</sup> The second author is a senior forest officer working in the FD.

plots as well as the entire Lawachara national park. All households of both categories replied that status of agroforestry is good enough (mean value 3.0) to support their livelihoods. They also said that forest conditions of the entire national park are good enough (mean score 3.0) to conserve regional biodiversity, even though there is some illicit felling. By visiting AF plots, 36 different tree species were identified. In another study Alam and Mohiuddin (1995) reported that at least 30 tree species were found to be used as betel leaf support trees, and there were 2,500–3,000 trees of varying diameter classes per hectare on a typical betel leaf AF plot. A report (NACOM 2003) mentioned the presence of 167 plant species, four amphibian species, six reptile species, 246 bird species, 20 mammal species, and 17 insect species in Lawachara national park. Forest officers also replied that though AF plots do not support wildlife, the overall biodiversity situation of the forest is reasonably good. Villagers claimed that as long as there are trees, they can practice agroforestry which indicates that forests are indispensable for their agroforestry and therefore also for their livelihoods.

### *Financial Capital and NGO Contributions*

Villagers commented that all households are moderately well off financially and generally do not need loans. However, if agroforestry production declines or households need money for emergency purposes (e.g. purchasing land in other areas), they obtain loans. During the study, five households said that they had loans: two in category A and three in category B. Each of those households had one loan, and a national NGO (Caritas) provided credit to them with an annual interest rate of 12 %. Regarding household savings, they said that they had money left for savings after paying all bills. When asked about food security using a three-level scale—surplus, sufficiency and shortage—all households commented that their income from agroforestry was sufficient to cover the costs of foods and other necessities.

### *Social Capital*

Indigenous people in uplands of mountainous countries are accustomed to solving problems by relying mainly on their own resources (Danchev 2005). These resources are social ties and networks, which are collectively expressed as social capital. Groups and network, and trust and solidarity, were considered in measuring household-level social capital. The status of household-level social capital is reported in Table 3. Household communication network (HCNs) are defined in terms of the number of households (whether kin, relatives or friends in their own or nearby villages) with whom a member of a household (mainly a household head) can share problems, ask for help, and request loans. The HCNs of category A households is 13 which was significantly higher than that of category B households (Table 4). A similar pattern was reported by respondents for number of people willing to help by giving money, number of people currently able to provide that money, and times travelled to relatives. All households of the Khasia *punji* visit relatives every year. The reasons for such visits are apparently to learn about agroforestry and help in farming activities, to visit and stay for leisure, to share

problems, and perhaps to obtain loans. More than 90 % of households of both categories said that they learn agroforestry techniques such as crop improvement, disease prevention and soil management from relatives. For example, two households of this Khasia *punji* applied inorganic fertilizer in 2005 for the first time, inspired by relatives (fathers-in-law) who live in a nearby Khasia *punji*, and have better betel leaf production (greener and larger leaves which fetch a higher price). It has been observed that social connectedness in uplands helps to spread new agricultural practices and technologies and bring about adoption (Wu and Pretty 2004). Farmer networks and information sharing help to access resources including knowledge, time and money necessary for practicing livelihood-earning activities and avoiding the poverty trap through economic growth (Peng 2004).

Though villagers (except *mantri*) do not have direct contact with forest officers, they believe that FD personnel are responsive, mostly honest, and would not do anything that might hamper their livelihoods. Their mutual trust helps them to live close together inside the forest. Most villagers (more than 80 %) considered that the wealth differential is sufficiently small to not create social stratification and induce conflicts. The *mantri* said that it is rare for major conflicts to arise in a Khasia *punji*.

Almost all households take part (typically for 4–5 days per year) in social development activities including repairing access roads and maintaining wells and prayer halls. As a community rule households donate equal amounts to cover needed costs for maintaining wells, roads and prayer halls. In addition to social work, collective action was observed in farming activities. If any household needs weeding on its AF plot, it sometimes invites some villagers to help, and this the

**Table 4** Mean annual income and expenditure per household of the studied Khasia *punji*

Variable	Household type	
	Category A	Category B
<i>Income (US\$)</i>		
Betel leaf	2,989	1,380***
Cows	42	—
Part-time wage labour	—	12
Service in NGO	63	—
Payments as tax	8	—
Average annual income per household	3,102	1,392***
<i>Expenditure (US\$)</i>		
Agroforestry costs	337	112**
Food	1,003	606***
Health care	13	4
Education	37	15
Livestock	13	—
Social work	9	4
Guards	38	9
Average annual expenditure per household	1,449	750***

\*\* Significant at the 1 % level;

\*\*\* Significant at the 0.1 % level

household arranges a feast for the helpers. Upton (2008) observed that collaboration amongst groups of resource users contributes to further strengthening of social capital, thus initiating a virtuous circle of cooperation, improved livelihoods, and enhanced resource management.

Villagers are strongly connected with other Khasia *punji*. In the Sylhet region all Khasia *punji* form a Khasia welfare society that deals with their problems and supports their interests. All households of all Khasia *punji* are members of the society. The society organizes a 36-h seminar twice a year in pre-selected Khasia *punji* and members share their opinions at the seminar. The Khasia welfare society maintains liaison with national and international NGOs and several donor agencies, and has a strong lobbying capacity to elicit decisions that favour Khasia community, which is evident from the following statement:

This society is so powerful that if anything happened, at any *punji*, against members' interests they could bring the matter quickly to the influential agencies [e.g. foreign embassies or donor agencies] to take immediate and necessary action, even before the national government or the concerned agency knows about it (Rahman 2005).

It can be concluded that existence of strong social capital helped villagers to obtain assistance in emergencies, obtain innovative knowledge on agroforestry from their neighbours and collectively manage common resources. Villagers said that these activities positively influenced their livelihood.

### Livelihood Strategies and Outcomes

Livelihood strategies are what people do in terms of production and consumption, in mediating social and institutional relationships and in the activities in which they engage to meet their livelihood needs and expectations (Long 2004). The livelihood strategies pursued by the Khasia villagers included mainly agricultural intensification and limited livelihood diversification. It was found that all their efforts are concentrated on the agroforestry system, which uses low-capital inputs (including local labour, organic fertilizer) and generates higher returns relative to cost through betel leaf production. In this indigenous agroforestry system,<sup>5</sup> villagers keep all the trees as shade and as support trees for betel leaf plants. They also keep saplings to use as support trees in coming years. Some households cultivate pineapples, lemons and other crops in *jhums*, but these are for household consumption rather than sale.

Diversification is an important dimension of livelihood strategies (Cramb et al. 2004). Discussions with villagers and forest officers, and personal observations, revealed that there is limited diversification of livelihood means in Khasia *punji*. This conforms to the findings of Perz (2005), who reported that rural households may choose not to diversify, preferring instead to specialize in a product to have higher financial returns. Three households had livestock, and one girl was working for an NGO operating a program for education, credit, savings, legal awareness and leadership development in the studied Khasia *punji*. Two women, after finishing

<sup>5</sup> An account of this agroforestry system has been reported by Nath et al. (2003).

their own work, were found to work part-time in other households. The *mantri* received a tax from *paikar* (middlemen) who come to Khasia *punji* to buy betel leaves. Five *paikar* came each day and purchased betel leaves from the Khasia *punji* 3 days a week. As a rule, every *paikar* paid US\$ 0.03 for one *kuri* (2,880 individual leaves) of betel leaves and received a receipt from the *mantri*. The receipt showed how many *kuri* of betel leaves the *paikar* purchased from the Khasia *punji*, and must be shown to the *aratdar* (market wholesaler) when selling the betel leaves. Without a receipt, the *aratdar* would not buy the betel leaves, which would be regarded as smuggled.

In order to reduce pressure on forests and to diversify villager livelihoods, a joint project of the FD and USAid called Nishorgo developed a co-management plan for the area, in which forest villagers were involved as key stakeholders. Under the project, social forestry programs, ecotourism and other income-generating activities were initiated (DeCosse 2005). The project also provided training for alternative livelihood activities.

Table 4 reports the outcomes of livelihood strategies in terms of income, expenditure, and major fund sources of households. In both categories of villagers, the principal source of income was betel leaf. Significant differences in betel leaf income ( $P < 0.004$ ,  $F = 8.29$ ) and mean household income ( $P < 0.007$ ,  $F = 9.33$ ) between the two groups were observed. Category A households could pluck more leaves from more AF plots and earned more money, generating income disparity. Khasia villagers' mean annual household income (US\$ 2246) was about three times as high as the national average per capita income of Bangladesh, which was US\$ 848 in 2012 (Government of Bangladesh 2012). Saha and Azam (2004), drawing data from another forest village, reported that the average income of Khasia forest villagers was seven times as high as the national average income.

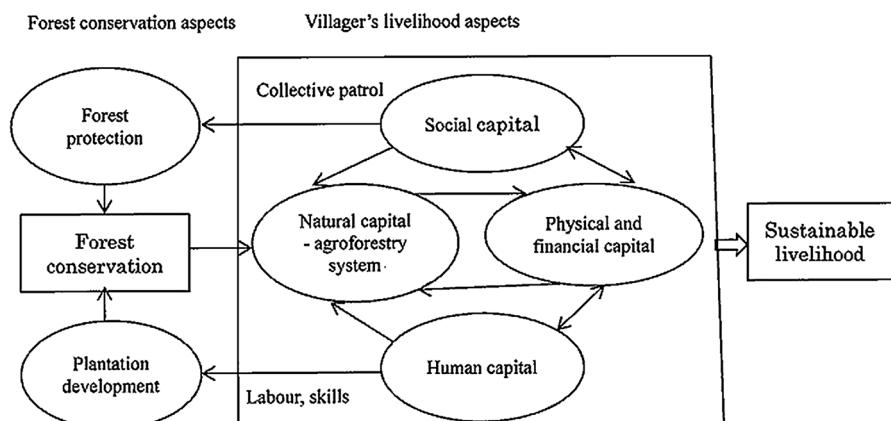
Major expenditure items included food and agroforestry costs, mainly labour. Foods purchased from markets include rice, fish, meat, spices, oil, snacks, confectionaries and tea. Villagers said that more than 80 % of their vegetables, including arum, jackfruit, various tubers, green leaves and mushrooms, are collected from forests, and their minimum dietary requirements are fulfilled from forest resources. Occasionally they buy fish and meat from markets. For social events (e.g. Christmas and New Year) they contribute money to the events committee according to their ability. Those who cannot patrol forests give US\$ 3.85/month to *mantri*, and with this money he employs temporary forest guards. This expenditure situation roughly expresses annual expenses. There are many other items such as clothing and daily expenses that were not assessed in this paper. However, these expenditures and gross annual income of sampled households (Table 4) confirm that villagers have some annual savings. In order to maintain steady production from the agroforestry system, all households invest their savings in acquiring additional AF plots. Even though they avoided answering the questions, forest officers and boys of the Khasia *punji* said that every household has AF plots away from their village. Extended family members or relatives look after these AF plots, which survey respondents visit occasionally for maintenance. Livelihood strategies and outcomes indicate that betel leaf, the main product of agroforestry system, was the key element to Khasia villager's livelihoods.

## Contribution of Khasia Villagers to Forest Conservation

Forest conservation involves those measures concerned with the protection and preservation of forest land. Villagers play a two-fold role in forest conservation: protection and plantation expansion. Figure 2 shows how Khasia people contribute to forest conservation and forest helps to maintain their livelihoods. Personal observations, talks with FD staff and villagers, and reports of NACOM (2003) indicate that the main threats to the forest of Lawachara national park are fuelwood collection by villagers, and illegal cutting of trees. In order to prevent illegal cutting, nine Khasia people in three shifts (three persons in each 8-h shift), working with FD guards, perform daily round-the-clock patrols along forest boundaries. Thanks to patrols, the forests still look like deep natural forests. In addition to these nine people, the FD calls more people if it needs an emergency force to tackle organized illegal logging gangs. The villagers cooperate actively, even at night. Even though fuelwood collectors extract dead trees and branches, they damage young plants and so reduce regeneration capacity of the forests. Establishment of buffer zones and development of participatory forests in these zones can reduce fuelwood collection.

The FD carries out plantation activities every year. Khasia villagers participate in all phases of plantation work from nursery establishment, seed collection, raising seedlings, site preparation, planting, and post planting plantation maintenance. Due to readily available labour, the FD can conduct tree-planting programs smoothly. Moreover, villagers conserve trees on their AF plots. Villagers commented that forests, AF and their livelihoods are interconnected, and keeping this in mind they participate effectively in forest conservation activities, and have been living in forests peacefully for more than 50 years. Scholars (for example, Walker 2004) argued that the coexistence of people and forests is possible only due to the intimate relationship between rural livelihoods and forest ecosystems.

As well as supplementing many food items, forests provide the asset base on which Khasia villagers practice agroforestry, and which they consider to be the



**Fig. 2** The reciprocal relationship between forest conservation and livelihood of the Khasia forest villagers

natural capital for their livelihoods (Fig. 2). Natural capital has a pivotal role in the livelihoods of the rural people, who depend directly on natural resources (Reddy et al. 2004). Life-long experience, skilled household labour, and deep-rooted cultural beliefs that are regarded as human capital enabled villagers to manage the agroforestry system sustainably. The betel leaf produced in this agroforestry system has both domestic and foreign markets (Nath et al. 2003). The sales generate financial capital (income) by which villagers purchase household implements and agricultural tools, and repair village infrastructure (e.g. roads and prayer halls) known as physical capital, and buy or lease land for expansion of agroforestry. Further, these villagers invest the financial and physical capital for smooth production of the agroforestry system, development of human capital (e.g. education), helping peers in emergencies by giving loans, and above all generating sufficient income for their living. Villagers, with mutual understanding<sup>6</sup> between themselves and FD staff members, also provide free labour (human capital) and collectively patrol (social capital) the forest for the development and protection of forest resources. Therefore, it is clear that there is a strong symbiotic relationship between the livelihoods of Khasia villagers and conservation of forest resources.

### Concluding Remarks and Policy Implications

Although forest villagers have not yet obtained permanent land title, they have developed and managed agroforestry sustainably, and taken part in the conservation of government forests. This adds to existing theory that even without permanent land tenure villagers can develop and practice agroforestry sustainably if it provides sufficient financial returns to maintain their livelihoods. However, the issues of insecure land tenure, agreement renewal and wage levels for their labour call for an acceptable solution to avoid future conflicts, although presently these do not have noteworthy effects on villagers' livelihoods and forest conservation.

The findings have potential implications for sustainable forest management in Bangladesh and hopefully in other developing countries. Forest villagers do exist in other parts of the country, but they are wage labours and sometimes involved in illegal logging (Nath et al. 2003). They do not have productive farming or agroforestry systems that support their livelihoods. A similar scenario can be observed in participatory forestry projects in upland areas, which could be brought under productive farming systems. Effective strategies for developing upland areas depend, however, upon identifying and implementing socially acceptable, financially profitable and environment friendly investments (Pender 2004). Careful identification of forest production technologies requires more attention to local

<sup>6</sup> In accordance with need, local personnel (FD Beat officers) contact the *mantri* to discuss the schedules of activities (e.g. of nursery operations and of establishing and patrolling plantations), and decide how many people they need for labour. Usually the *mantri* ask the FD to restrict the number of villagers so it does not exceed one-third of the *punji*'s households in a day. Villagers said that agroforestry management would be hampered if more than one-third of the households were called out in a day. In most cases, the FD agrees, but more labour is needed for large works. If villagers cannot supply adequate labour from their *punji*, they hire outside labourers.

preferences and market demand, and villagers must be given the necessary institutional support. If people obtain livelihood support from appropriate forestry policies, then they will see that becoming effectively involved in forest management is in their own interest.

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